# Installation and Operating Instructions

## Flap-type Flow Meter

## KLA

## KLA-GS

## KLA-V4A

## KLA-IK

## KLA-IKS

## KLA-EM

Kirchner und Tochter

A. Kirchner & Tochter GmbH  Dieselstraße 17 · D-47228 Duisburg
Fon: +49 2065 9609-0 · Fax: +49 2065 9609-22  Internet: www.kt-web.de · e-mail: info@kt-web.de
Version 2.6

Contents

1. Foreword ... 3
2. Safety ... 3
2.1. Symbol and meaning ... 3
2.2. General safety directions and exemption from liability ... 3
2.3. Intended use ... 3
2.4. Special safety directions for glass devices ... 4
2.5. Information for Operator and operating personnel ... 4
2.6. Regulations and guidelines ... 4
2.7. Notice as required by the hazardous materials directive ... 4
3. Transport and storage ... 4
4. Installation ... 4
4.1. Mounting position KLA ... 5
4.2. Installation KLA ... 6
5. Start-up ... 6
6. Readings in operation ... 6
7. Limit switches ... 6
7.1. Connecting the limit switches ... 7
7.2. Adjusting the limit switches ... 7
8. Analogue output EM ... 9
8.1. Functional principle ... 9
8.2. Connection ... 9
9. Maintenance and cleaning of the low meter ... 10
10. Service ... 10
10.1. Disposal ... 10
11. Technical data ... 11
11.1. Dimensions ... 12
11.2. Technical data of limit switches ... 13
11.3. Analogue output EM ... 13
11.4. Round connector ... 14

# 1. Foreword

These Installation and Operating Instructions are applicable to devices of Series KLA. Please follow all instructions and information given for installation, operation, inspection and maintenance. The Instructions form a component part of the device, and should be kept in an appropriate place accessible to the personnel in the vicinity of the location. Where various plant components are operated together, the operating instructions pertaining to the other devices should also be observed.

# 2. Safety

## 2.1. Symbol and meaning

Safety notice

This safety notice can be found at all hints on work safety in these assembly and operating instructions pointing out hazards for life and limb of persons. Such notices should be strictly observed.

## 2.2. General safety directions and exemption from liability

This document contains basic instructions for the installation, operation, inspection and maintenance of the flap-type flow meter. Failure to comply with these instructions can lead to hazardous situations for Man and Beast and also to damage to property, for which Kirchner und Tochter disclaims all liability.
The Operator is required to rule out potentially hazardous situations through voltage and released media energy.

## 2.3. Intended use

The KLA Series device is a flap-type VA flow meter for fluids. It is designed for installation in horizontal or vertical pipe runs. In vertical pipe runs, flow through the device must be from below. Installation in the pipeline may only be carried out in accordance with these Instructions. Select the version of the flap-type VA flow meter on the basis of the pipe diameter at the installation location of the device. The limit values for the device are specified in Section 10 and must be complied with. Any modifications or other changes made to the measuring device may be carried out solely by Kirchner und Tochter. Details pertaining to the fluid product and operating conditions are noted on the scale.

## 2.4. Special safety directions for glass devices

For safety reasons, we recommend placing a protective shield in front of the measuring device before starting up flow meters fitted with glass panels. The devices should not be operated where there is risk of pressure surges!

## 2.5. Information for Operator and operating personnel

Authorized installation, operating, inspection and maintenance personnel should be suitably qualified for the jobs assigned to them, and should receive appropriate training and instruction. All persons charged with assembly, mounting, operation, inspection and maintenance duties must have read and understood the operating instructions. Gaskets in contact with the fluid product must be replaced after all maintenance and repair work.

## 2.6. Regulations and guidelines

In addition to the directions given in these Installation and Operating Instructions, observe the regulations, guidelines and standards, such as DIN EN, and, for specific applications, the codes of practice issued by DVGW (gas and water) and VdS (underwriters), or the equivalent national codes, and applicable national accident prevention regulations.

## 2.7. Notice as required by the hazardous materials directive

In accordance with the law concerning handling of waste (critical waste) and the hazardous materials directive (general duty to protect), we would point out that all flow meters returned to Kirchner und Tochter for repair are required to be free from any and all hazardous substances (alkaline solutions, acids, solvents, etc.).

Make sure that devices are thoroughly rinsed out to neutralize hazardous substances.

# 3. Transport and storage

The KLA device is packed by the factory in packaging appropriate for transportation and storage. Transport and storage should be carried out solely in the original packaging. Protect the device against rough handling, impact, jolts, etc.

# 4. Installation

Flap-type flow meters are suitable for installation in either vertical or horizontal pipe runs. In vertical pipe runs, flow must be from bottom to top.
Make sure the pipes are correctly spaced and in true alignment at the installation location for the flow meter. For connection of the KLA device, fit the open ends of the pipeline at the installation point with flanges appropriate to the flow meter.
Straight unimpeded pipe runs upstream and downstream of the meter's installation location should have a length equal to a minimum of 2 x DN

## 4.1. Mounting position KLA

When the KLA is mounted horizontally with left/right or right/left flow direction, make sure that the device is installed with the scale facing the front.
This position will ensure that the device functions properly (see Figure 1).

The device cannot function if it is installed with the scale facing upwards or downwards (see Figure 2).
**Figure 1** shows correct installation of the device.
The scale faces the **front**.

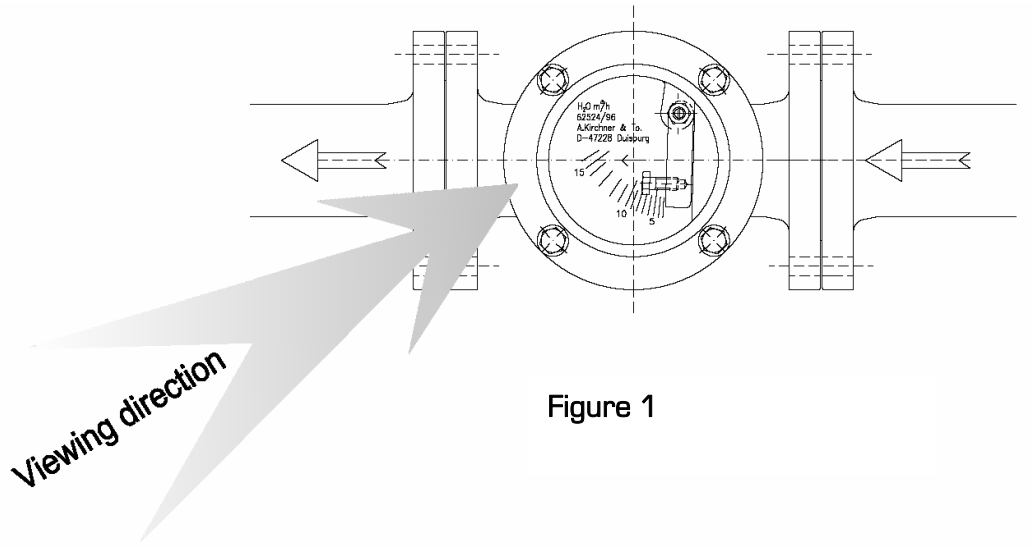



Figure 1

In **Figure 2** the device has been installed incorrectly.
The scale faces **upwards**.

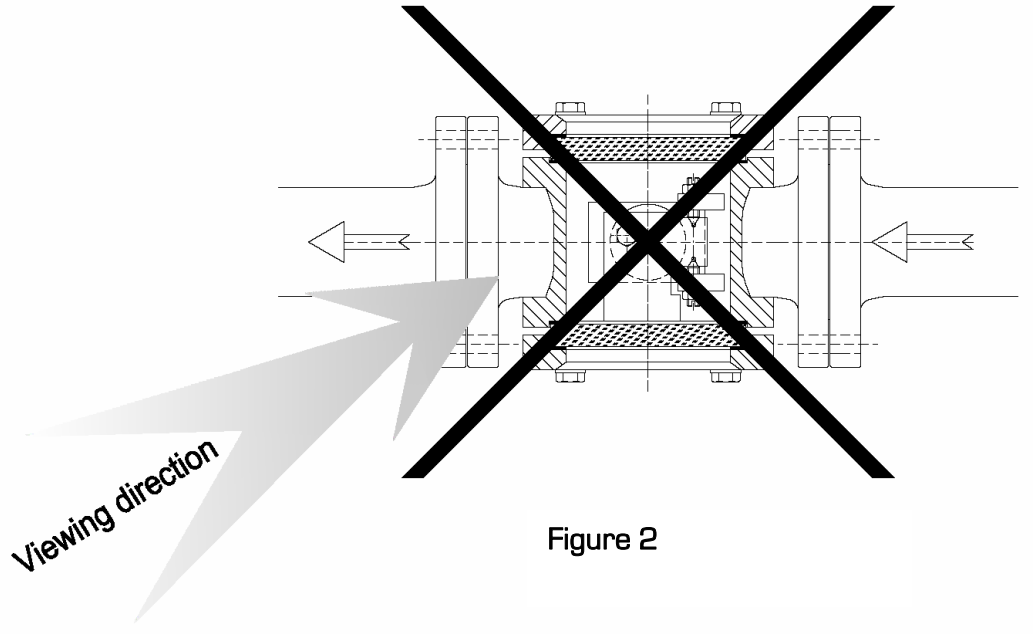



Figure 2

## 4.2. Installation KLA

For mounting, provide the connection flanges of the KLA with suitable flat gaskets. The gaskets are not included with the flow meter.
Before installing, remove the transport lock from inside the device, and fit the open pipe ends with appropriate connecting flanges. Make sure the pipes are in true alignment and the sealing faces spaced correctly. Install the device in the direction of flow indicated by the arrow on the scale such that it is free from stresses. Use gaskets made of rubber, PVC or Teflon.

# 5. Start-up

The device must have been properly installed before it is started up.

- Test the device connections.
- Setting the flow: pressurize the pipelines by slowing opening the shutoff valves. In the case of liquids, make sure the pipeline is carefully vented.
- Check the leak-tightness of all components and if necessary retighten threaded joints and bolted connections.

# 6. Readings in operation

On the standard device, values are read off at the pointer on the resopal scale.
On the KLA GS version, the flow rate is indicated directly by the flap. At the front and rear, the flow meter features in each case a pane of hard glass. The flow rate is read off from a scale attached to the front hard glass pane on a level with the top edge of the KLA flap.
Measured values are correct only when the operating condition at the measuring point (flowing medium, operating pressure and temperature) corresponds to the operating state data marked on the scale.

# 7. Limit switches

The flow meter can be equipped with limit switches with preset switching point to provide local indication with monitoring function. The switches have a bistable characteristic.

The following devices are equipped with limit switches:

| | | |
|---|---|---|
| KLA Standard-IK | with | SJ3,5N / SC3,5-NO-BU |
| KLA Standard-IKS | with | SB3,5-E2 |
| KLA V4A-IK | with | SJ3,5N / SC3,5-NO-BU |
| KLA V4A-IKS | with | SB3,5-E2 |

Uncontrolled current and voltage peaks can occur in the case of inductive or capacitive loads, e.g. from contactors or solenoid valves. Such peaks will also occur, depending on cable geometry, when cables exceed a certain length. We therefore recommend using an MSR contact protection relay, which can be additionally supplied. This will increase the contact rating and prevent the occurrence of inductive and capacitive peaks, thus ensuring long service life of the contacts.
Electrical data and limit values are specified in Section 11.2.

## 7.1. Connecting the limit switches

Electrical connection of the device should be carried out in conformity with the relevant VDE regulations (or equivalent national standards) and in compliance with the regulations issued by your local power supply utility.

⚠ Disconnect the system from supply before connecting the limit switch.
Provide a protective circuit for the switches in keeping with their capacity.
Connect appropriate fuse-elements on the line side (matched to consumption).
Connect the cable using the supplied right-angle plug. The circuit diagram for the limit switches is given in the technical data, Section 11.2.

## 7.2. Adjusting the limit switches

The KLA is adjusted during factory assembly to the customer-specific switching points.

If a new setting is required, the switching point can be changed by moving the pointer vane.

The switching function can be reversed by specifying whether the pointer vane first enters or first exits the slot sensor.

E.g.:

| | |
|---|---|
| Limit switch IK: | SC3,5-NO-BU NAMUR, normally closed (Ex-protection) |
| Standard (normally closed): | When the switching point is reached, the pointer vane moves into the limit switch which then opens. |
| Reversed (normally open): | When the switching point is reached, the pointer vane moves out of the limit switch which then closes. |
| Limit switch IKS: | SB3,5 E2 PNP, normally open |
| Standard(normally open): | When the switching point is reached, the pointer vane moves into limit switch which then closes. |
| Reversed (normally closed): | When the switching point is reached, the pointer vane moves out of the limit switch which then closes. |

In order to make the settings, the perspex screen has to be removed.

1. First Remove the tensioning ring out of its groove, using a small screwdriver.
2. Take the perspex screen from the ring.
3. Make sure that the o-ring located under the screen is not lost! It secures the scale space from dust and dirt ingress.

You have now access to the limit switches and the pointer vane.

⚠ CAUTION:
Each device by Kirchner und Tochter is tested for leaks before delivery.
Loosening the hex screws of the housing ring can lead to leakage. Material damage or health hazards resulting may arise from fluid leakage. Kirchner und Tochter does not assume any liability for improper use.

Before you start adjusting, make sure that the fluid line is closed!

Adjusting the limit switches:

1. Move the pointer to the desired switching point and fix it.
2. Loosen the pointer vane by loosing the pointer axis nut.
3. The coarse adjustment of the switching point is carried out via the pointer vane. Turn until one of the vanes edges, reaches the limit switch. Wich edge is depending on the switching function of the limit switch and the flow direction

The switching funktion of the contact can be set, depending on whether the pointer vane moves into the contact or moves out of him, when reaching the switching point.

4. If you have a device with more than one limit switch, adjust them as described in point 3.
5. Fasten the pointer vane by tightening the pointer axis nut. (Pointer should not move!)
6. Loosen the pointer from its fixation and check whether it is free to move across the entire measuring range.
7. Check the switching point, by moving the pointer through it manually.

Fine adjustment is made by moving the contact.

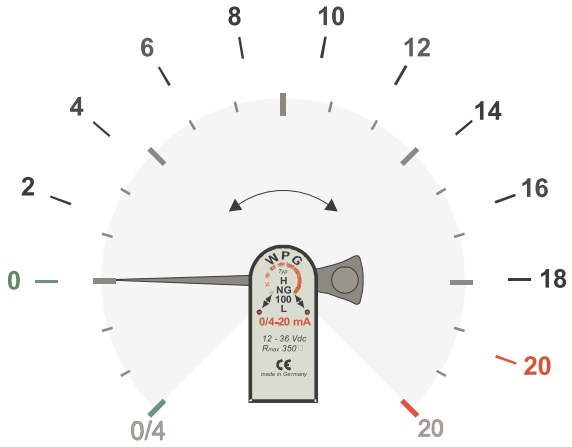
1. Loosen the limit switch screw.
2. Move it gently along the casing wall up to a maximum of 2mm.
3. Tighten the grub screw back in and check the switching point by moving the pointer through it manually.

After successful adjustment of the limit switches, you must install the perpex screen again.

1. Insert the o-ring into the corresponding groove.
2. Put the perspex screen back in. Make sure that the o-ring does not slip out of its groove.
3. Put the tensioning ring carefully into the corresponding groove.

## 8. Analogue output EM

The angular position encoder EM is a 3-wire sensor, which delivers an output signal (4...20 mA) proportional to the angular position of the pointer. This signal, for example, can be used to realize a remote display.
A linearization is possible at up to 14 points. Furthermore various input and output filters ensure operation in industrial environments.

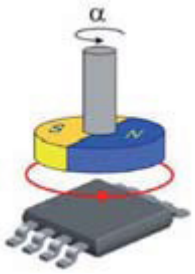



The following devices are equipped with limit an analogue output:

| | | |
|---|---|---|
| KLA Standard-EM | with | WPG NG100-L |
| KLA V4A-EM | with | WPG NG100-L |

### 8.1. Functional principle

The direction of the magnetic field of a rotatable mounted magnet, which is moved by a fork, is detected by a Hall-sensor, processed by a digital processor and converted to an output signal of 4...20 mA.

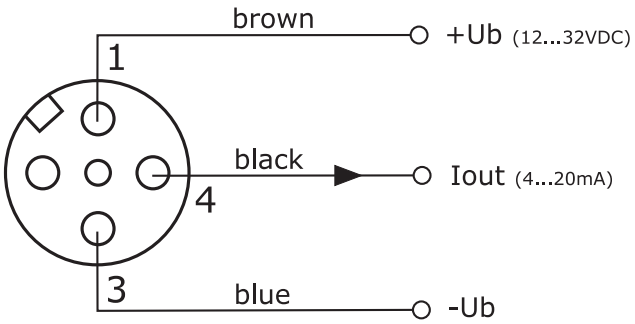



### 8.2. Connection

The analogue output EM is connected through an customizable round connector (see 10.4.).

Pin 1(+Ub) and 3(-Ub) are connected to the power supply 12...36VDC (direct current).

Pin 4(Iout) is the analogue output. The current is measured between pin 4(Iout) and pin 3 (-Ub).



## 9. Maintenance and cleaning of the low meter

The KLA can be opened from the back. Undo the fastening screws on the rear cover and take the cover off. Remove any dirt and deposits that may have accumulated in the casing and on the flap. The shaft of the flap runs on pivot bearings. Should these have too much play, the device can also be opened from the front. Detach the lock nuts and retighten the bearing screws. Then retighten the lock nuts. The flap must be positioned so close to the front plate that, without the seal, it just slightly rubs against this plate. If the seal is then re-inserted before final assembly, the flap will move freely. The pointer must be able to move freely across the resopal plate. Be sure to replace the cover to close the device tightly.

## 10. Service

All devices with defects or deficiencies should be sent direct to our repair department. To enable our customer service facility to deal with complaints and repairs as quickly as possible, you are kindly requested to coordinate the return of devices with our sales department, Tel. +49 2065-96090.

### 10.1. Disposal

Please help to protect our environment, and dispose of workpieces in conformity with current regulations or use them for some other purpose.

# 11. Technical data

| | |
|---|---|
| Connection | to DIN 2501<br>optionally: ASA 150 lbs |
| Pressure rating | PN 10 (standard) or PN 6 (special version)<br>cast steel: PN25 |
| Fitting dimensions | DN 25 - 200 / ½" - 8" |
| Mounting length | see Table |
| Corrosion protection | epoxy resin paint, traffic blue RAL 5017, stove-enamelled |
| Rubber lining | NR-isoprene quality |
| Temperature resistance[1)] | standard: 100°C<br>with rubber lining: max. 90°C<br>special version: max. 150°C |
| Ambient temperature[1)] | max. 90°C |
| Turndown ratio | normally 1:10 |
| Measurement uncertainty | 5% FS |
| Viewing window | pressed hard glass |
| Degree of protection | in conformity with IP 54, switches: IP 53 |

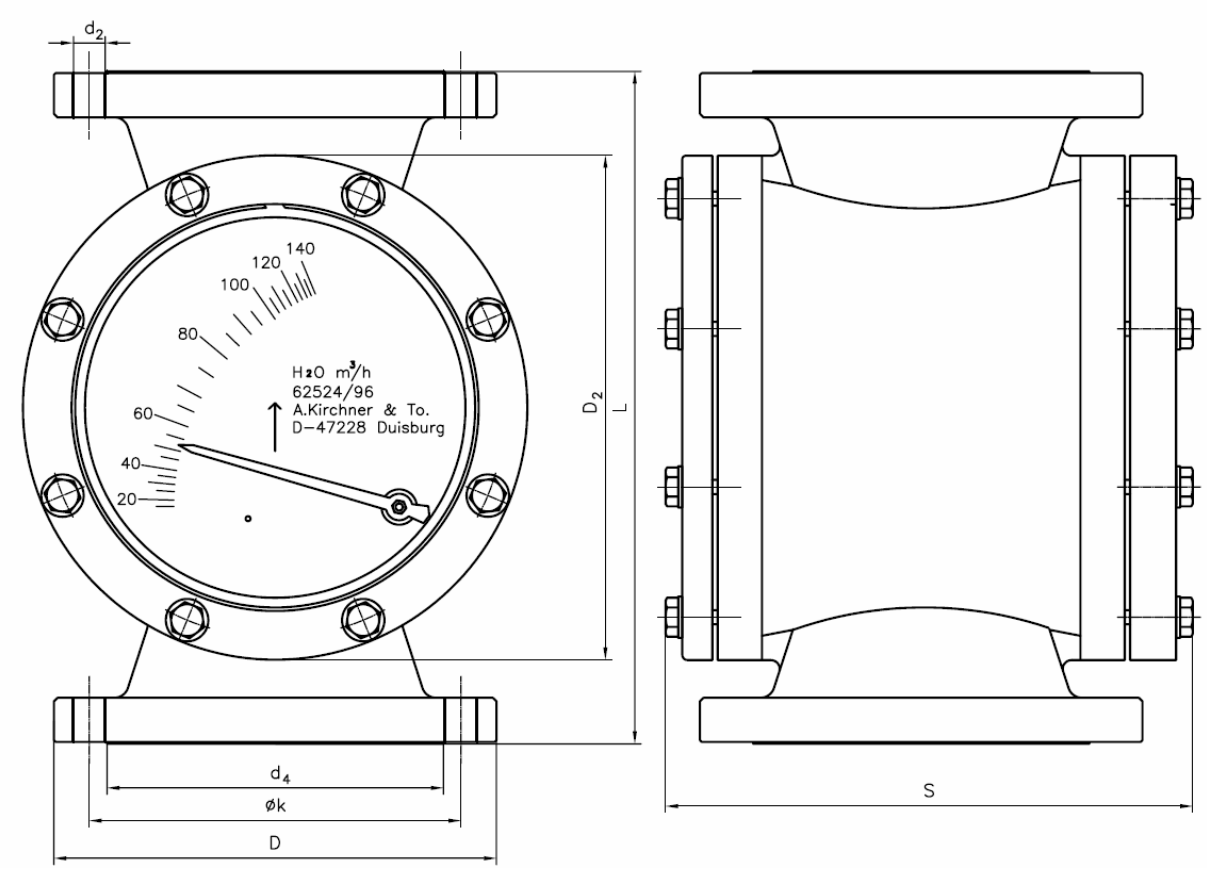
[1)] On no account may the fluid product be allowed to freeze

## Materials

| Type/device<br>KLA Standard | Flap | Bearings | Plate | Blind flanges | Gasket | DN |
|---|---|---|---|---|---|---|
| Grey cast iron | 14.571 | 14.571 | 14.571 | Grey cast iron/steel | NBR | 15 - 150 |
| Grey cast iron | Rg 5 | 14.571 | 14.571 | Grey cast iron/steel | NBR | 32 - 150 |
| Welded steel | Rg 5 | 14.571 | 14.571 | Steel | NBR | 200 |
| KLA V4A | | | | | | |
| Welded stainless steel | 14.571 | 14.571 | 14.571 | 14.571 | Viton | 25 - 100 |
| KLA GS | | | | Ring | | |
| Grey cast iron | 14.571 | 14.571 | Glass | Steel | NBR | 15 - 25 |
| Grey cast iron | Rg 5 | 14.571 | Glass | Steel | NBR | 32 - 150 |
| KLA rubber-lined version | | | | Blind flange | | |
| Grey cast iron, rubber-lined | 14.571 | 14.571 | 14.571 | Grey cast iron/steel, rubber-lined | Sil-C8200 | 32 - 150 |
| Grey cast iron, rubber-lined | Hastelloy C4 | Hastelloy C4 | VA-Teflon | Grey cast iron/steel, rubber-lined | Sil-C8200 | 32 - 150 |
| Grey cast iron, rubber-lined | Teflon | Hastelloy C4 | VA-Teflon | Grey cast iron/steel, rubber-lined | Sil-C8200 | 80 - 150 |
| Grey cast iron, rubber-lined | Teflon | Teflon | VA-Teflon | Grey cast iron/steel, rubber-lined | Sil-C8200 | 80 - 150 |

Other gaskets, rubber linings (e.g. with drinking water approval) and coatings with Teflon (HALAR) or cast grades such as steel, SG iron, bronze, VA or Hastelloy on request

## 11.1. Dimensions



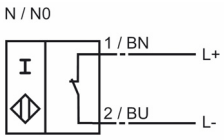
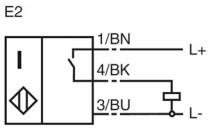

| DN | D | $d_4$ | k | h | Number of bolts | $d_2$ | L | D2 | S Standard | S GS | S IK | S EM | Weight [kg] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 95 | 45 | 65 | 16 | 4 | M 12 | 170 | 119 | 145 | 132 | 159 | 166 | 8 |
| 20 | 105 | 58 | 75 | 16 | 4 | M 12 | 170 | 119 | 145 | 132 | 159 | 166 | 8,5 |
| 25 | 115 | 68 | 85 | 16 | 4 | Ø 14 | 170 | 119 | 145 | 132 | 159 | 166 | 8,5 |
| 32 | 140 | 78 | 100 | 21 | 4 | Ø 18 | 240 | 165 | 176 | 186 | 190 | 197 | 16 |
| 40 | 150 | 88 | 110 | 21 | 4 | Ø 18 | 240 | 165 | 176 | 186 | 190 | 197 | 16 |
| 50 | 165 | 102 | 125 | 21 | 4 | Ø 18 | 240 | 165 | 176 | 186 | 190 | 197 | 17 |
| 65 | 185 | 122 | 145 | 21 | 4 | Ø 18 | 280 | 185 | 201 | 217 | 215 | 222 | 22 |
| 80 | 200 | 138 | 160 | 22 | 8 | Ø 18 | 320 | 225 | 214 | 227 | 228 | 235 | 34 |
| 100 | 220 | 158 | 180 | 24 | 8 | Ø 18 | 350 | 245 | 267 | 278 | 281 | 288 | 43 |
| 125 | 250 | 188 | 210 | 24 | 8 | Ø 18 | 380 | 285 | 299 | 310 | 313 | 320 | 58 |
| 150 | 285 | 212 | 240 | 24 | 8 | Ø 22 | 380 | 295 | 299 | 310 | 313 | 320 | 64 |
| 200 | 340 | 268 | 295 | 27 | 8 | Ø 22 | 550 | 370 | 386 | – | 400 | 407 | 104 |

All dimensions in mm

## 11.2. Technical data of limit switches

The following devices are equipped with limit switches:

KLA Standard-IK with SJ3,5N / SC3.5-N0-BU
KLA Standard-IKS with SB3,5 E2

| Inductive limit switches | | | |
|---|---|---|---|
| Designation | | SC3,5-N0-BU | SB3,5 E2 |
| Properties | | adjustable, bistable | adjustable, bistable |
| Switching function | | NAMUR NC contact | NO contact |
| Voltage switched (max.) | | 8 V DC | 10 - 30 V DC |
| Temperature limits | | -25°C to 100°C | -25°C to 70°C |
| Explosion protection | | with KFAEx1 | |
| Circuit diagram | |  |  |
| Pin assignment: | | | |
| | 1 | 2/BU | 3/BU |
| | 2 | 1/BN | 1/BN |
| | 3 | unassigned | 4/BK |
| | PE | unassigned | unassigned |

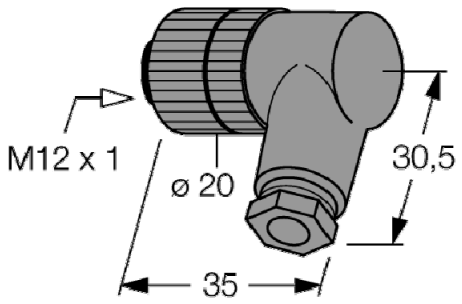
Connection via right-angle plug (pole number: 3 + PE) to DIN 46350, model A, with screwed cable gland M16 (IP65)

## 11.3. Analogue output EM

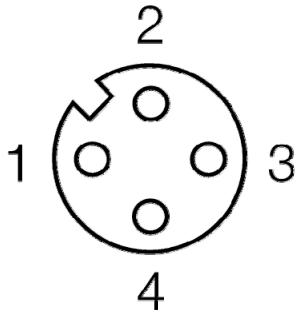
| Analogue output EM | |
|---|---|
| Accuracy | ± 1% |
| Temperature drift | ± 0,005 % / K |
| Temperature resistance | -20°C... +70°C |
| Operating voltage (Ub) | 12... 36 VDC |
| Load impedance<br>50Ω at 12V Ub | 300Ω avt 24V Ub |
| Power consumption | < 0,2 W, load-free output |
| Output function | Three-wire, analogue output |
| Current output | 4...20 mA |
| Measuring cycle | 250 ms |
| Lifetime | > $10^6$ cycles |
| Protection class | IP64 |

## 11.4. Round connector

| Round Connector | |
|---|---|
| Connector | field-wireable female connector, M12 x 1, angled |
| Number of poles | 4-pole |
| Contacts | metal, CuZn, optalloy-plated |
| Contact carriers | plastic, PA, black |
| Grip | plastic, PBT, black |
| Seal | plastic, FPM |
| Degree of protection | IP67, when screwing is tightened |
| External diameter of the cable | 4...6mm |
| Core cross-section/ Clamping ability | max. 0.75 $mm_2$ |
| Screw-in thread | PG 7 |
| Connection mode | screw clamp |
| Mechanical lifespan | min. 50 contact durability |
| Rated voltage | max. 250 V |
| Insulation resistance | ≥ $10^8$ Ω |
| Ampacity | 4 A |
| Forward resistance | ≤ 8 mΩ |
| Ambient temperature | -25... +85°C |



dimensions



pin assignment

The equipment from **Kirchner und Tochter** has been tested in compliance with applicable CE-regulations of the European Community.

The respective declaration of conformity is available on request.

Technical data supplied without liability. The current valid version of our documents can be found under this URL: www.kt-web.de

The **Kirchner und Tochter** QM-System is certified in accordance with DIN-EN-ISO 9001:2008. The quality is systematically adapted to the continuously increasing demands.

Kirchner und Tochter

A. Kirchner & Tochter GmbH  Dieselstraße 17 · D-47228 Duisburg
Fon: +49 2065 9609-0 · Fax: +49 2065 9609-22  Internet: www.kt-web.de · e-mail: info@kt-web.de
Version 2.6